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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/528,386	12/23/2005	John E. Madocks	APT 02.01	4635

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EXAMINER	
PHILOGENE, HAISSA	
ART UNIT	**PAPER NUMBER**
2821	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/10/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/528,386	MADOCKS, JOHN E.	
	Examiner	Art Unit	
	Haissa Philogene	2821	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 December 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *20-46* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *20,21,23-25,30,32,33,35-40,42 and 44* is/are rejected.

7)☒ Claim(s) *22,26-29,31,34,41,43,45 and 46* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 May 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *5/9/06;12/27/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

Claim 1 is objected to because of the following informalities: In line 3, after "said nozzle" add –with an aperture—to comply with claim 23. Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 20, 21, 23, 25, 30, 32, 33, 35-40, 42 and 44 are rejected under 35 U.S.C. 102(b) as being anticipated by Helmer et al., Patent No. 5,482,611.

As per claims 37 and 38, Helmer discloses in Figs. 1A-1C an apparatus and method for producing a plasma stream, comprising in combination: (1) a discharge cavity (123) containing at least one magnetron cathode for generating electrons; and (2) magnets (150-152) disposed exterior of said discharge cavity generally facing one another for creating a cusp magnetic field within said discharge cavity as a result of magnetic field lines (155) created by the magnets and forming also a magnetic null filed region (see Fig.1C and Col.7, lines 1-7).

As per claims 39, 40, 42 and 44, Helmer discloses the claimed invention substantially as explained above. Further, Helmer discloses the discharge cavity (123) having a first width W; a null magnetic mirror having a loss-cone (see Fig.1B and Col.4, lines 35-46) readable as a nozzle capable of providing a conduit for electron flow from

said discharge cavity (123), with a second width (see Fig. 1B, not labeled) less than the first width; and an inlet (128) for introducing an ionizable gas into the discharge cavity (123); said ionizable gas inlet (128) being located between said at least one cathode (120) and magnetic mirror nozzle within the discharge cavity (123); and a power supply selected from the group consisting of DC power (-400 V) (see Fig.1C) and RF power (see Col.13, lines 62-65).

As per claims 20, 21 and 23, Helmer discloses the claimed invention substantially as explained above. Further, Helmer discloses the at least one cathode electrode (120) for supporting at least one magnetron discharge within the discharge cavity (123); wherein the magnetic field null region is located along a centerline of magnetic mirror nozzle aperture of the cathode container (120) (see Fig.1B).

As per claims 25, 30, 32 and 33, Helmer discloses the claimed invention substantially as explained above. Further, Helmer discloses a process chamber (not shown) to receive the beam plasma source (see Fig. 1C and Col.7, lines 42-44); wherein the beam plasma source includes a cusp magnetic field formed by magnetic field lines (155) producing at least one magnetron confinement zone within the discharge cavity (see Col.7, lines 5-7); and a power supply (-400V) connected to said cathode (120) (see Fig.1C).

As per claim 35, Helmer discloses in Fig.1A a plasma processing apparatus, comprising: an enclosure (123) defining a cavity; a power supply (-400V) interconnected with said enclosure to render said enclosure a cathode electrode (120);

a cusp magnetic field defining a magnetic field null region, formed by magnetic field lines (155) created by magnets (150-152), disposed within the cavity; and said cusp magnetic field comprising a first portion and a second portion, said first portion creating a closed drift electron magnetron confinement region (1) within the cavity, and said second portion producing a mirror confinement region (11) passing through and out of said cavity (see Figs. 1A and 1B).

As per claim 36, Helmer discloses a method for treating a substrate (130, 630) with a plasma beam (170, 670) comprising the steps of: providing a process chamber (not shown); locating within the process chamber a plasma beam source (110) comprising a discharge cavity (123) having a first width W, a null magnetic mirror having a loss-cone (see Fig.1B and Col.4, lines 35-46 and Fig.6) readable as a nozzle extending outwardly from said discharge cavity (123, 623), with a second width (see Figs.1B and 6, not labeled) less than the first width; a plurality of magnets (150-152) disposed adjacent to and external of the discharge cavity, said magnets creating at least one magnetron confinement region, formed by the magnetic field lines (155), within the discharge cavity; and a conduit (128), other than the nozzle, for introducing an ionizable gas into the discharge cavity; placing the substrate (130, 630) within the process chamber (not shown) and external to the plasma beam source (110); introducing an ionizable gas (argon) into the discharge cavity through the conduit (128); igniting a plasma within the magnetron confinement region by applying the high negative voltage (-400V); projecting the plasma through the nozzle and onto the substrate (as shown in Fig.6).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Helmer et al.

Helmer discloses the claimed invention substantially as explained above except for the cathode electrode being formed of a material which has a secondary electron emission coefficient greater than about 1. However, this feature is well known in the magnetron sputtering system art where a magnetron cathode structured with electrode coated with material such as barium oxide which has a secondary electron emission coefficient of one or more. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the well known cathode electrode into the Helmer 's plasma beam source, because it would ensure a magnetron cathode electrode of elongated life capable of continuous use.

Allowable Subject Matter

Claims 22, 26-29, 31, 34, 41, 43, 45 and 46 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Madocks, Patent No. 6,919,672; Madocks, Patent No. 6,911,779; Madocks, Patent No. 7,038,389; Anders, Patent No. 6,137,231.

Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Haissa Philogene whose telephone number is (571) 272-1827. The examiner can normally be reached on 8:30 A.M.-6:00 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Callahan can be reached on (571)272-1740. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

hp

Haissa Philogene
Primary Examiner
A.U. 2821